Botulism and bioterrorism

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Biological Weapon

Botulism toxin is the most potent lethal substance known to man (lethal dose 1ng/kg). Botulism toxin is made by the bacterium *Clostridium botulinum*.

Botulinum toxin was developed as an aerosol weapon by several countries. No human data exist on the effects inhaling botulinum toxin, but it may resemble the foodborne syndrome.

If people have intentionally been exposed, in a bioterrorist attack, breathing in the toxin or ingesting the toxin via contaminated food or water are the most likely routes of exposure that might lead to a serious illness (foodborne botulism).

Spores of C. botulinum are found in soil worldwide. Terrorists with the technical capacity to grow cultures of the bacterium, and harvest and purify the toxin could therefore use it as a bioterrorism agent. Contaminating food with botulism toxin could cause a devastating event.

The Disease

About 25 cases of foodborne botulism occur each year, usually due to improperly prepared home-canned or Alaskan Native foods. Outbreaks from commercial products and foods prepared improperly in restaurants have also occurred.

Botulism is a muscle paralyzing disease caused by a nerve toxin that is made by a bacterium called Clostridium botulinum. The toxin types most commonly associated with human disease are types A, B, E.

There are three main kinds of botulism.

1. **Foodborne Botulism** occurs when a person ingests PRE-FORMED toxin that leads to illness within a few hours to days. Only foodborne botulism is a public health emergency, because it could indicate that a food is still available to other persons (besides the patient).
2. **Infant botulism is a condition that** occurs in a small number of susceptible infants each year. For unknown reasons the botulism bacteria is able to grow in their intestines. Infant botulism is not a public health emergency because the infants are not consuming food with toxin; rather they are consuming C. botulinum spores (which are everywhere in the

environment), but for unknown reasons these few infants are susceptible to gut colonization.

3. **Wound botulism** is caused by the growth of living botulism bacteria in a wound, with ongoing secretion of toxin that causes the paralytic illness. In the United States this syndrome is seen almost exclusively in injecting drug users.

Symptoms of botulism include double vision, blurred vision, drooping eyelids, slurred speech, difficulty swallowing, dry mouth, muscle weakness which always descends the body:
first shoulders, then upper arms, then lower arms, then thigh, calves, etc. Paralysis of breathing muscles can cause a person to stop breathing and die, unless he/she is assisted by a ventilator. For foodborne botulism, symptoms begin from six hours up to two weeks after eating toxin-containing food; most commonly the delay is about 12-36 hours. Infants with botulism appear lethargic, feed poorly, are constipated, and have a weak cry and muscle tone.

The Risk

Foodborne botulism can occur in all age groups.

Botulism is not spread person-to-person.

Botulism can result in death due to respiratory failure if appropriate medical care is not available. However, in the past 50 years the proportion of patients with botulism who die has fallen from about 50% to 8% because of improved medical care in intensive care units.

Treatment

CDC maintains the national botulism anti-toxin supply. A physician diagnosing a case of botulism and wishing to treat the patient with anti-toxin must contact the CDC through their state health department. This way public health officials are alerted immediately about potential cases of botulism.

CDC provides clinical consultation to physicians for botulism cases 24 hours a day, ships botulism antitoxin when needed.

If symptoms occur, individuals should seek treatment. Botulism can be fatal and should be considered a medical emergency.

The paralysis and respiratory failure that occur with botulism may require a patient to be on a breathing machine (ventilator) for weeks, plus intensive medical and nursing care. The paralysis slowly improves, usually over several weeks. If diagnosed early, foodborne and wound botulism can be treated with an antitoxin from horse serum which blocks the action of toxin circulating in the blood. This can prevent patients from worsening, but recovery still may take many weeks.